

The Regional University Excellence Trust Fund programs of distinction are:

- Eastern Kentucky University: justice and safety
- Kentucky State University: aquaculture
- Morehead State University: institute for regional analysis and public policy
- Murray State University: telecommunications systems management
- Northern Kentucky University: center for integrative natural science and mathematics
- Western Kentucky University: applied research and technology, forensics, and media for the twenty-first century

One of the dimensions of POD success in 2005-06 was the prospect for commercial application of many applied research projects. These projects include:

- ECU is developing Advanced Rural and Remote Surveillance Technology (ARREST), a remote surveillance security system that can be deployed by law enforcement personnel in detecting and prosecuting crimes.
- MoSU's Space Science Center project, of which IRAPP is a major partner, is a public-private partnership that establishes global positioning system base stations in Somerset, Campbellsville, Cumberland, and Morehead to address the significant gap in coverage in eastern Kentucky, as identified by the National Geodetic Survey (NGS) network.
- KSU researchers are working with a private firm to establish reservoir ranching of paddlefish in the water supply reservoirs around the state.
- WKU's applied research and technology POD has generated several projects with potential for commercialization, including the study of a plant extract that is effective against Herpes Simplex Virus in cell culture, U.S. Border Patrol testing of the commercial prototype of a robotic microgravity/resistivity device for the detection of subsurface voids, and a partnership with USDA/ARS to develop a cattle evaluation facility that can add as much as \$30 per head profit for cattle.
- MuSU, in cooperation with the University of Louisville and the Kentucky Community and Technical College System, continued working on a U.S. Department of Homeland Security (DHS) grant to develop a rapidly deployable set of communications equipment that can be built in Kentucky to create jobs, with an increase in grant funds from \$10,000 to almost \$40,000 per year. A company has been formed by a venture capitalist to manufacture and market products from this research project.

Translational Research

During FY 2006, the Council's Research, Economic Development, and Commercialization Policy Group, chaired by Council member John Hall, began to examine the impact of translational research on improving the lives of Kentuckians. Research and innovation have the potential to directly impact commercialization ventures that result in spin-off companies and the creation of economic development clusters. Education is the primary driver of economic development in Kentucky, and

increases in the level of educational attainment will have a significant positive impact on the economic growth and the quality of life for Kentucky citizens.

In order to create and sustain a “talentforce” within Kentucky, the state must encourage and provide incentives for research and innovation within its postsecondary institutions. In an effort to address this issue, President Layzell and the Council directed CPE staff to develop an issue paper that examined the relationship between translational research and economic development within the Commonwealth. A “Translational Research” issue paper was developed in June/July 2006 that addressed:

- 1) the quality and quantity of faculty research
- 2) the assistance/expertise of faculty and institutions to foster commercialization activities in the state
- 3) competitive intellectual property and commercialization incentives
- 4) the capacity of research facilities to attract and keep the best researchers in the state

This and other salient issue papers comprised the agenda for the annual CPE retreat held in August 2006. A translational research conference including positioning researchers and state/national leaders is planned for 2007 to identify opportunities for enhancement of Kentucky’s translational research.

Science, Technology, Engineering and Mathematics (STEM)

The STEM disciplines (science, technology, engineering, and mathematics) are essential if Kentucky is to develop the “talentforce” that drives knowledge economy jobs. STEM disciplines provide the foundation for future advancements in commercialization and innovation. At the national level, in February 2006, Congress approved \$790 million in Academic Competitiveness and SMART Grants to encourage rigorous course taking in high school and to support undergraduate students who major in math, science, or critical languages. At the state level more needs to be done to strengthen the STEM pipeline and encourage a greater number of postsecondary graduates in STEM-related fields.

The CPE Research, Economic Development, and Commercialization Policy Group, chaired by John Hall, began to examine STEM pipeline issues during 2006. President Layzell directed CPE staff to develop an issue paper that examined the complex factors related to the STEM pipeline. The resulting issue paper explored the STEM pipeline within the context of collaboration, leadership, action, and assessment strategies that might have a positive effect on STEM production within Kentucky. This and other salient issue papers formed the agenda for the August 2006 CPE retreat. A statewide STEM Task Force was formed in fall 2006 to identify strategies to improve the STEM educational pipeline and workforce.

Kentucky Education Network - www.ken.ky.gov

A Kentucky and perhaps a national first occurred when the entire education community, under the coordination of the Education Cabinet, submitted a joint budget request for technology initiatives that would benefit everyone. The result is a \$30 million appropriation to build a high-speed data network called KEN (Kentucky Education Network).

The vision of KEN is:

- 1) To develop a seamless education-centric network that will grow and scale to meet new, increasing, and unforeseen needs to support equitable life long learning for all Kentuckians.
- 2) To break down the physical and political barriers between secondary and postsecondary education.
- 3) To share learning content and resources throughout P-20 both virtual and physical.

KEN will facilitate the development, deployment, and operation of a set of seamless P-20 applications. It will support advanced research and education applications in order to further Kentucky's educational agenda. It will connect every college, university, and K-12 school district in the state to enhance the learning experience of students at all educational levels, regardless of geographic location. Also connected will be the agencies of the Education Cabinet and their statewide locations.

Internet2 – www.i2.ky.gov

In 2005, Kentucky joined the Internet2 Sponsored Education Group Participants (SEGP) program under the sponsorship of the University of Kentucky to open the Internet2 access to all universities, community colleges, schools, libraries, museums, and the Education Cabinet and its agencies.

Internet2 is a not-for-profit advanced networking consortium comprising more than 200 U.S. universities working in cooperation with 70 leading corporations, 45 government agencies, laboratories, and other institutions of higher learning as well as over 50 international partner organizations. Led by the research and education community since 1996 to solicit interest in Kentucky's economic development priorities, Internet2 promotes the missions of its members by providing both leading-edge network capabilities and unique partnership opportunities. Only the University of Kentucky and the University of Louisville had been members of Internet2.

Internet2 applications enable collaboration among researchers, instructors, students, and interactive access to information and resources in a way not possible on today's Internet. For example:

1. K-20 interactive collaboration – A science teacher in Owsley County can dissect an anatomical specimen for her class, zooming, rotating and putting it back

together, and discuss this virtual dissection with researchers at Murray State University and Stanford University in real time.

2. Resource-sharing – Math teachers in Clay County can interactively participate professional development workshops conducted live from the University of North Texas and Western Kentucky University without leaving their classrooms.
3. Remote instrumentation – A student at Frankfort High School taking a biology class can operate a microscope located in Lehigh University in real time.
4. Digital libraries – A student in Bowling Green can perform simultaneous, intelligent search and retrieval of KET's rich reservoir of videos, the Kentucky History Center's oral tapes and artifacts, and the Filson Club's photographs as she works on her multimedia assignment at Western Kentucky University's Library and Museum.
5. Performing arts – A student of violin in Powell County can audition or take a master class with the Manhattan School of Music via Internet2 H.323 videoconferencing with low latency in audio and video transmission.

Kentucky Virtual Campus and Virtual Library

Kentucky has a rich tradition in distance learning. It ranks first in the southeast for the number of students taking distance learning courses. To keep Kentucky at the top and take it to the next level, the Kentucky Virtual University underwent a year-long strategic planning process that resulted in a new name (*Kentucky Virtual Campus*) and a renewed focus on eLearning for all Kentucky citizens. One of the goals of these resources is to make available to all Kentuckians, as well as "digital visitors," a knowledge-based economy inclusive of a well-trained workforce.

Vision: The Kentucky Virtual Campus aspires to create a technology-supported, lifelong learning environment that results in better lives for Kentucky's people.

Mission: The Kentucky Virtual Campus serves as a statewide advocate for access to learning through technology, a convener of partners that uses resources effectively, and a catalyst for innovation and excellence in eLearning.

EDUCATIONAL PIPELINES TO KNOWLEDGE-BASED ECONOMIES

Statewide Strategy in Engineering and Project Lead the Way

A joint engineering program began in 2001 with funding from the science and technology trust funds, designed to engage more students in science and math careers to create a Kentucky workforce to support a knowledge-based economy. This joint program involves the leadership of engineering faculty at Murray State University, Western Kentucky University, University of Kentucky, and University of Louisville. Through Web-based learning more students across the Commonwealth have access to careers in engineering. These programs at the four institutions enrolled 2,743 students in FY 05-06 and awarded 339 baccalaureate degrees to engineering students in 2006, 170 of which were from the regional institutions. In addition, one of the institutions was successful in creating three new ABET-accredited engineering programs.

The Council's Statewide Joint Engineering Strategy calls for P-16 programs to increase the number of students preparing for careers in engineering and related careers. The Council has convened private sector, P-12, and postsecondary representatives to develop this strategy. The 2006-08 Council budget request contained funding to implement programs in middle/high schools and community colleges that will increase the number of students in the pipeline for careers in engineering and science, technology, and math while utilizing the increased capacity created by the joint programs.

A key component of the Statewide Joint Engineering Strategy was to increase the number of Kentucky high school graduates prepared to succeed in engineering programs at the postsecondary level. The Council received 2006-08 funding to assist the Kentucky Department of Education in developing an articulated engineering pipeline to increase the number of Kentucky students prepared for engineering degrees through implementation of Project Lead The Way®, the model pre-engineering curriculum recommended in the 2006 National Academies report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. During the summer of 2006, CPE and KDE staff awarded \$650,000 of Council funding to 13 school districts across the Commonwealth to implement or expand the Project Lead The Way® curriculum. Criteria used to score the proposals included computer availability, teacher availability/certification, elementary school integration, middle school program, student progress, instructional space, and a student recruitment plan. A recent survey of superintendents indicates 25 additional districts are ready and interested in joining the PLTW program. Placing PLTW programs in 25 more Kentucky school districts will cost an additional \$2 million.

Kentucky Satellite Project

One successful pipeline program related to the engineering strategy has been the development of a satellite project in collaboration with faculty and students from a number of the public postsecondary institutions. KentuckySat (KySat) emerged through the work of the Kentucky Science and Technology Corporation's Advanced Concepts Office at NASA Ames Research Center in Mountain View, California. Created in 2004, the office facilitates and extends the work of KSTC and Kentucky in areas related to space research and development (R&D) and planetary sub-surface exploration. KySat is a joint enterprise involving public organizations, colleges and universities, and private companies in a student-led initiative involving the design, build, launch, and on-orbit operation of small satellites to promote science, technology and engineering, innovation, and education. KySat's strategy is to train and support students in the dynamics of spacecraft design, development (including payloads), launch and on-orbit operation of small satellites as a means of extending science, technology and engineering, education, innovation, and entrepreneurship in Kentucky.

After successfully reaching orbit, KySat will be made available at no cost to Kentucky (and partner) schools, students, and parents for an array of educational applications and purposes. KySat will involve an ongoing series of satellite design, build, and launch projects – each with varying scope and capacity.

Teacher Quality Initiatives

2006 Teacher Quality Summit

In 2006 the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine issued the report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Future*, which outlines a comprehensive strategy to address our nation's need for high-quality jobs and energy independence. Its recommendations focus on P-12 education, postsecondary education, and economic policy. Improving the preparation and professional development of teachers and increasing the pipeline of students ready to earn degrees in science, technology, engineering, and mathematics are critical to improving America's—and the Commonwealth's—quality of life.

The 2006 Teacher Quality Summit in Louisville October 23-24 focused on the need to increase the supply and quality of mathematics, science, and world language teachers. Co-sponsored by Kentucky's public universities, the Association of Independent Kentucky Colleges and Universities (AIKCU), and the Council, the event convened chief academic officers, deans and faculty in arts and sciences and education, K-12 educators, and other state policymakers to discuss postsecondary education's contributions to teacher quality in Kentucky. National speakers included Dr. Pearse Lyons of Alltech, Inc., Dr. Charles Coble of The Third Mile Group, and Dr. Joe Dell Brasel of ACT, Inc. This summit's agenda also included world language learning and increasing the availability of world language teachers as requisite to Kentucky's global competitiveness.

Improving Educator Quality State Grant Program

Kentucky's Public Agenda for Postsecondary and Adult Education, *Five Questions, One Mission: Better Lives for Kentucky's People*, calls for a profound shift in the way the postsecondary system approaches its work. The Improving Educator Quality (IEQ) State Grant Program addresses Question 1 of this five-question agenda, "Are more Kentuckians ready for postsecondary education." IEQ is an integral part of Kentucky's effort to ensure that all P-12 educators receive high-quality professional development that focuses on improving student achievement with priority given to math, science, and world language programs.

State-Level Initiatives to Increase College Student Transfer

House Bill 1 called for a fundamental shift in postsecondary education participation and emphasized the role of educational attainment in sustaining the general welfare and material well-being of the Commonwealth. In order to fulfill the promise of postsecondary education reform, Kentucky must increase college enrollment and graduation and infuse the postsecondary pipeline with more students at both undergraduate and graduate levels. In short, Kentucky must double the number of working-age adults with baccalaureate degrees to 791,000 by 2020 to reach the national average in educational attainment.

As Kentucky advances its Public Agenda for Postsecondary and Adult Education and moves toward the national average in educational attainment by the year 2020, issues surrounding college student transfer are increasingly important. College student transfer is one of the key components of Kentucky's strategy for reaching the 2020 goals. CPE projects that approximately 11,500 students will need to transfer from Kentucky's two-year to four-year postsecondary institutions by the year 2020.

CPE and Kentucky's postsecondary education partners have been actively engaged in the expansion of efforts to promote college student transfer since the late 1990s. Since 2003, the number of college student transfers from two-year to four-year institutions has increased steadily.

Workforce/Transfer Trust Fund scholarship monies awarded in CPE's 2006-08 budget focused on STEM careers and critical areas of workforce needs, including new economy areas. Current initiatives to promote college student transfer at the state-level may be found on the Council's Web site: <http://www.cpe.ky.gov/NR/rdonlyres/05C9F848-5789-429D-BBE9-933338B7E802/0/TransferStudySummarySCOPE.pdf>.

Completer degrees were required of all public universities by the Council in 2004. Completer degrees are intended to allow students with an associate degree to complete a bachelor's degree within the normal number of hours required for a bachelor's degree by the institution. CPE staff has compiled information on the status of completer degree program development and is exploring ways to expand the capacity of these programs.

GEAR UP

GEAR UP Kentucky is a \$63 million, ten-year (2000-2011) federal initiative that encourages young people to stay in school, study hard, and take the right courses for college. The program is focused on improving the skills of at-risk students and influencing their educational choices through enhanced guidance and support, particularly in math and science achievement. GEAR UP also helps students prepare and plan for college and become aware of financial aid opportunities.

Unlike many other programs, GEAR UP works with partnerships of schools, colleges, businesses, community, and non-profit organizations. Partners provide early intervention services for students and work to transform the culture of a school so that every student is prepared for and encouraged to pursue college. Also, GEAR UP supports entire cohorts of students (all students in one grade), beginning in the seventh grade and ending the freshman year of college.

The U.S. Department of Education awarded Kentucky its second GEAR UP grant in 2005, extending the Kentucky program through 2011. Administered by the Council, program staff continue to work with middle schools to continue making improvements in school curriculum, instruction, and school climate ensuring achieved changes with grant resources. For information on the federal GEAR UP initiative, visit www.ed.gov/gearup.

This summary of the Council's efforts related to a knowledge-based economy is limited to major state-level initiatives as described above. The work of all educators is to prepare students, whether traditional or adult learners, to lead productive lives, and contribute to the economy in their communities, state, and nation. It is difficult to separate any of the work of postsecondary education from its impact on a "knowledge-based economy." For full reports about the contributions of the Kentucky Council on Postsecondary Education to this effort, please visit the Council's Web site at www.ky.gov/cpe.